



**Full Length Research Article**

**LAPAROTOMIES IN CHILDREN IN LOW RESOURCE CIRCUMSTANCES: OUR EXPERIENCE IN CHINGOLA-ZAMBIA**

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**ARTICLE INFO**

**Article History:**

Received 14<sup>th</sup> November, 2015  
Received in revised form  
26<sup>th</sup> December, 2015  
Accepted 08<sup>th</sup> January, 2016  
Published online 17<sup>th</sup> February, 2016

**Key Words:**

Abdomen,  
Laparotomy,  
Pain,  
Peritonitis.

**ABSTRACT**

Abdominal conditions in children are always a challenge to a general surgeon working at a district hospital in a developing country like Zambia, in most situations working alone with limited resources. The situation is compounded by the shortage of specialized pediatric surgeons in the vicinity, shortage of specialized investigations like CT scan or MRI and limited laboratory investigations. Our focus of the research was Chingola, a mining town in the Copperbelt province of Zambia with a population of 200,000(2011 census). Below are the tools used and experience we had with children who presented with abdominal problems that needed operative surgery. This was a prospective study carried out from June 1997 to May 2002, a period of five years. At laparotomy the most frequent finding was peritonitis, seen in 26 patients. (54.2%), intestinal obstruction seen in 16 patients, (33.3%), worm infestations seen in 13 patients (27.1%) and abdominal trauma of about 5 patients(10.4%). There was a complication rate of 31.25%. The commonest complication was Pneumonia in 5patients (10.4%), wound site infection in 4 patients (8.3%), wound dehiscence in 2 patients (4.2%), sepsis in 2 patients (4.2%) and malnutrition in 2 patients (4.2%). All but two children were discharged from the hospital the average stay was 10.3 days. Two children died from complications of surgery. Children who present with acute abdomen will be mostly from an infective process; therefore, taking a thorough history and physical examination will help in arriving at the diagnosis.

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**INTRODUCTION**

Chingola is a Mining Town on the Copper belt Province of Zambia with a population of over 200,000 people, Most of whom depend on the Mining activities for their livelihood. The town is serviced by two hospitals namely Nchanga South Hospital run by Konkola Copper Mines and Nchanga North General hospital which is run by the Government of the Republic of Zambia (GRZ). Abdominal conditions in children are always a challenge to a general surgeon working at a

district hospital in a developing country like Zambia, in most situations working alone with limited resources. The situation is compounded by the shortage of specialized Pediatric Surgeons in the vicinity, shortage of specialized investigations like ultrasonography, CT scan or MRI and limited laboratory investigations. Therefore, the challenge is whether to open the abdomen or to treat conservatively and making that decision in good time. Here is presented our experience with children who presented with abdominal problems that needed operative management.

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**MATERIALS AND METHODS**

The period of study was from June 1997 to May 2002 – a period of five years. This was a prospective study. During the period of study the author did all the abdominal surgical operations in the two hospitals. All the children who were

admitted at the two hospitals and had Laparotomy were included in the study. A child was defined as anybody from birth to the age of 15 years. A form was designed and each child's particulars were entered detailing the following; Age and sex of the patient, the presenting complaints, and the general condition of the child before the operation i.e. hydration status which was clinically determined as follows:

- Mild if there was dry tongue with/without loss of skin turgor.
- Moderate if there was a dry tongue, loss of skin turgor with sunken eyeballs or fontanel.
- Severe if in addition to all the above there were mental changes-irritability or drowsiness,

Whether or not there was anemia. Significant anemia was described as hemoglobin estimation of 10g/dL or less. The findings of the physical examination of the abdomen before surgery were also recorded including the preoperative investigations done, the findings at laparotomy and the outcome of the operation. That included the duration of hospital stay, complications and whether the child was discharged or died. All our patients were given preoperative antibiotics regimen being Metronidazole and Ampicillin. The policy was to aggressively manage all the children who presented with abdominal problems. Those we suspected needed operative management were operated as soon as the patient was resuscitated at most within 24 hours of admission.

## RESULTS

During the period of study there were 4,200 admissions to the hospitals (all ages). There were 48 children who underwent Laparotomy with a prevalence rate of 1.12%. The youngest child was 3 weeks old and the oldest was 15 years.

### Age and Sex Distribution

There were 21 male children and 27 female children (the male to female ratio was almost 1:1). The age distribution was as shown in Table 1. The mean age was 6 years. The children were in two serious age groups of those between 3-4 years of age and those between 9-10 years of age.

Table 1. Age distribution

Age(years)	0-2	3-4	5-6	7-8	9-10	11-12	13-14	15
Female	06	06	04	02	07	01	00	01
Male	02	07	02	02	05	02	00	01
Total	08	13	06	04	12	03	00	02

### Presenting Complaints

All but four patients presented with serious acute complaints. (See Table 2)

### Condition of Patients before Laparotomy

This was determined in terms of: Hydration status, the BUN and electrolyte balance and presence of anemia. 13% had Moderate to severe dehydration. 10 patients had presented with

low Electrolyte status and 11 patients had elevated BUN Balance (see Tables 3, 4 and 5)

Table 2. Presenting complaints

COMPLAINT	NO. PATIENTS (%)
Abdominal pain	35(72.9)
Swelling of abdomen	15(31.2)
Body hotness	14(29.2)
Vomiting	14(29.2)
Constipation	13 (27.1)
Mass in abdomen	06(12.5)
Blood in stool	02(4.2)
Headache	02(4.2)
Diarrhea	01(2.1)

Table 3. Hydration status

Hydration status	No. of children (%)
Normal hydration	31(64.6)
Mild dehydration	10(20.8)
Moderate dehydration	06(12.5)
Severe dehydration	01(2.1)

Table 4. Electrolyte balance

Electrolyte	Normal	Low	High
Sodium	42	06	00
Potassium	46	01	01
Chloride	45	03	00

Table 5. Bun balance

Bun level	No. of patients
UP TO 8mmol/L	37
> 08 TO 15mmol/L	10
ABOVE 15mmol/L	01

### Anemia

There were 19(39.6%) patients who had significant anemia.

### Physical Examination Findings

Tender abdominal presentation was the highest, this was followed by fever, Tachycardia and distention of the abdomen (See Table 6)

### Findings at Laparotomy

Peritonitis was the most common finding, this was followed by Intestinal obstruction, and worm infestation. 10.4% patients were victims of trauma Five patients had multiple pathologies (See Table 7)

### Peritonitis

The causes of Peritonitis was varied but the commonest was the Necrosed bowel with worm infestation (See Table 8)

### Intestinal Obstruction

The causes of Intestinal Obstruction occurred in 08 (50%) of the patient who had this problem. It was due to the presence of Worms (See Table 9)

**Table 6. Physical examination findings**

Findings on examination	No. of patients(%)
F ever	31(64.6)
Tachycardia	31(64.6)
Tender abdomen	35(72.9)
Distended abdomen	27(56.2)
Visible abdominal injury	03(6.3)
Visible abdominal peristalsis	02(4.2)
Fecal fistula	01(2.1)
Normal abdomen	03(6.3)

**Table 7. Gross findings at operation**

Laparotomy finding.	No. of patients (%)
Peritonitis	26(54.2)
Intestinal obstruction	16(33.3)
Worm infestation	13(27.1)
Abdominal trauma	05(10.4)
Miscellaneous	04(8.3)

Five patients had multiple pathologies

**Table 8. Cause of Peritonitis**

Cause	No. of Patients(%)
Necrotized bowel with worm infestation	05(19.2)
Patchy necrosis small bowel (Necrotizing enterocolitis)	04(15.4)
Burst appendix	04(15.4)
Primary peritonitis	04(15.4)
Subphrenic and Hepatic abscess	02(7.7)
Typhoid perforation	02(7.7)
CMV Perforation	01(3.85)
Intussusceptions	01(3.85)
Fecal fistula	01(3.85)
Infected haematoma	01(3.85)
TOTAL	26(100)

**Table 9. Causes of Intestinal Obstruction**

Cause	No. of patients (%)
Worm Obstruction	08(50)
Hirschprung's Disease	02(12.5)
Intussusceptions	01(6.25)
Sigmoid Volvulus	01(6.25)
Adhesions	01(6.25)
Paralytic Ileus	01(6.25)
Imperforate Anus	01(6.25)
Ectopic Anus	01(6.25)
Total	16(100)

### Intestinal Obstruction

The manifestations of worm Infestation was mainly due to Bowel Obstruction followed by Obstruction with bowel perforation (See Table 10)

**Table 10. Manifestations of worm Infestation**

Pathology	No. of patients
Bowel Obstruction only	08
Obstruction with bowel perforation	03
Burst appendix due to appendicular obstruction	01
Worm Infestation with paralytic Ileus + pus	01
TOTAL	13

### Trauma

Only five patients had Trauma, but the biggest challenge was in one child who had Rapture of spleen (See Table 11)

**Table 11. Abdominal Trauma**

Type of trauma	No. of patients
Abdominal wall haematoma- Infected	02
Omental and mesenteric Injury	02
Rapture of spleen	01
TOTAL	05

### Miscellaneous

Miscellaneous findings were found in 4 patients and the most interesting were those who had Ovarian Tumors. (See Table 12)

**Table 12. Miscellaneous findings**

Pathology	No. of patients
Ovarian Tumors	02
Abdominal Lymph nodes	01
No Pathology	01
TOTAL	04

### Most Operated on Children

The most frequently operated upon children were those that were 3-4 years old and those that were 9-10 old. (See Table 13)

**Table 13. Pathologies in the most operated upon children**

Pathology	No. of patients	
	3-4 Years	9-10 Years
Worm Obstruction	04	05
Primary peritonitis	02	02
Bowel necrosis (Necrotizing enterocolitis)	03	01
Abdominal trauma	00	03
Typhoid perforation	02	00
CMV perforation	01	00
Hepatic abscess	01	00
Tumors	00	01
No pathology	01	00

### Outcome

The outcome was measured in terms of hospital stay, complications and mortality.

### Hospital Stay

The shortest stay was one day and the longest was 60 days. The average hospital stay was 10.3 days (See Table 14)

### Complications

There were complications in 15 children, two of whom had multiple complications. See Table 15)

### Mortality

Two patients died among the study group. One died after staying for a day, the second died after a week and both had peritonitis

Table 14. Hospital stay

Days	1-5	6-10	11-15	16-20	21>
No. of Patients(%)	04(8.3)	31(64.6)	05(10.4)	01(2.1)	07(14.6)

Table 15. Complications

Complication	No. of Patient
Pneumonia	05(10.4)
Wound Infection	04(8.3)
Wound dehiscence	02(4.2)
Fecal fistula	02(4.2)
Septicemia	02(4.2)
Malnutrition	02(4.2)

## DISCUSSION AND CONCLUSION

During the period of study there were 48 children admitted to the two hospitals needing laparotomy for various abdominal problems. There were almost equal numbers of male and female children. It was observed that there were two peaks of presentation; at the ages of 3-4 and 9-10 years. (Table 1). In terms of presenting complaints from the child's parents or relatives: Aviral *et al* in India found the complaint of acute abdominal pain was the most common symptom (88.6%) followed by fever (56%) and vomiting (50.67%) (Aviral, Chana, 2005). We found the major complaints to be; Abdominal pain (72.9%), swelling of abdomen as distension (31.2%), Body hotness presenting as fever (29.2%), vomiting (29.2%) and constipation (27.1%). As shown in Table 2. These are fairly similar figures however we found that the second most important finding was abdominal distension followed by fever. Most likely this fever in our patients could have come from the cases of worms infestation being the major causes of peritonitis. The main findings on physical examination were; Tender abdomen (72.9%), fever and Tachycardia (64.6%), and distended abdomen (56.2%).-Table VI .these were also similar to findings by other workers (Aviral, Chana, 2005).

Although the majority of the patients were in a good state at presentation, 17 patients presented with dehydration and 10 had electrolyte imbalance. The most common electrolyte imbalance was hyponatremia which was seen in six patients. Some of the patients presented with renal impairment in that 11 patients presented with an elevated BUN (Tables 3,4& 5). Anemia was found 19(39.6%) of the patients Very often Laparotomies carried out without the use of Ultrasound result in operations where there is no significant finding. Despite our lack of modern diagnostic tools like Ultrasonography which are supposed to reduce negative laparotomies (Nagar *et al.*, ?; Babcock, ?) all these children had positive laparotomies only one child had a negative Laparotomy: This was a three weeks old baby who had vomiting and distended abdomen, this points to the fact that a good clinical examination and a high index suspicion is essential to the management of these children. The positive laparotomy rate was 97.9% this means that when children present with the above shown signs and symptoms there are a high probability that they have a significant pathology in their abdomen.

Peritonitis was the most common finding at laparotomy; the causes were varied, the most common were Necrosis of bowel due to worms, Necrotizing enterocolitis, burst appendices and primary peritonitis (Table 8).Where as in the West the most common cause of bowel perforation is foreign bodies (Nagar *et al.*, ?). In our case it was worms. Most of the patients who had burst appendices presented late as peritonitis and as reported by Cappendijk and Hazebroek ; these children fraught with complications (Cappendijk, 2000). In this study we did have children whom had peritonitis. However no cause could be found, thus we called it primary peritonitis. This entity we are aware is rare (Phoebe *et al.*, 2005).

The second most common finding was Intestinal obstruction. Round worms as a cause of abdominal trouble was also recognized (Table 7). Mugala reports that the most frequent cause of intestinal obstruction in children in the same area was *Ascaris Lumbricoides* (Mugala, 1998). In this report 50% of the cases of intestinal obstruction the cause was round worms (Table 9). Firdous *et al* in their analysis of 50 patients found worm obstruction in only 10% of the cases (Van der Zee, 1999) quite different from our findings but then our environmental situations are most probably different. The worms were also the cause of bowel perforation as stated above, a burst appendix and paralytic ileus (Table 10). Trauma did not feature prominently as a cause of acute abdomen in children, only few of our patients came as a result of trauma (Table 12).

Curiously the most frequently operated on children were the 3-4 year olds and the 9-10 year olds, the reason for this was not clear. In the younger group the most prominent indications were; worm obstruction and necrotizing enterocolitis, in the older group it was worm obstruction followed by trauma. Primary peritonitis was seen with equal frequencies in both groups (Table 13). It would appear that older children are more prone to trauma, also reported by Shah, and the younger ones to bowel infection. Worms seem to affect both groups despite conflicting reports suggesting that younger children are more likely to get worm obstruction than older children (Cappendijk and Hazebroek, 2000; Mugala, 1998) because of the narrower bowel lumen. The outcome was generally good, we lost two children, these presented late, one died within 24 hours of arrival one died of severe malnutrition. This could be attributed to the aggressive management style and the use of prophylactic antibiotics although some argue that prophylactic antibiotics

may not be necessary (Aslan *et al.*, 2007). We agree with Hugo that laparotomy in these children should not be delayed (Hugo *et al.*, 1998). In terms of hospital stay, the majority of our patients stayed six to ten days with an average stay of 10.3 days (Table 14). Despite our good outcome we did however have complications in 15(32.25%) of our patients the most common being Pneumonia followed by wound infection (Table 15). Children who present with acute abdomen problem will, in more than half of the time, be because they have an infective process. Careful basic examination and investigation followed by a laparotomy will result in a good outcome. Some complications should be expected in these often very ill patients. We pursued a policy of aggressive management rather a wait and see approach. Once a child was examined and investigated an operative management was planned for and the child underwent a laparotomy. While we bemoan the complications we encountered we feel the outcome in the majority of our patients was good.

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